

Do Tariffs Improve Trade With China?

An Alternative Approach to Interpreting Bilateral Trade Balances

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Executive Summary

Trade with China has brought real benefits to American consumers. Jaravel and Sager (2019)¹ estimate that increased trade with China raised the annual purchasing power of the average U.S. household by about \$1,500 between 2000 and 2007, with especially large gains for lower-income households. These benefits do not mean that the U.S.-China economic relationship is problem-free. The United States has valid concerns about China's state-led economic model, weak intellectual property protection, and restrictions on U.S. access to Chinese service and digital markets. In response, the United States began imposing tariffs on Chinese goods in 2018 under Section 301 of U.S. trade law, and tariff measures have continued to expand since then.

This brief argues that tariffs are not well matched to the problems they are supposed to solve. Trade between economies exists because each side specializes in what it produces relatively well, and that specialization can raise welfare on both sides. Bilateral trade deficits are often a normal result of these specialization patterns, not proof that trade is unfair or harmful. For this reason, many economists caution against using trade deficits — especially bilateral trade deficits — as a simple measure of whether an economic relationship is healthy. The broader U.S. current account deficit also reflects capital flows: the United States attracts foreign investment, which helps finance domestic borrowing and investment. A trade deficit, by itself, does not tell us whether trade policy is succeeding or failing.

Tariffs are also costly. They raise prices for American consumers and firms, invite retaliation against U.S. exporters, and disrupt supply chains without necessarily solving the underlying problem. They can also encourage firms to spend resources seeking political protection rather than improving productivity or innovation. Even if the goal is to reduce the bilateral deficit with China, tariffs are the wrong tool. Our analysis shows

that the most important channels in U.S.–China trade are not limited to direct imports from China. Modern trade depends heavily on services embedded in manufactured goods and on supply chains that move through third countries such as Mexico and Vietnam. Tariffs on direct Chinese imports do not effectively reach these channels.

Using a well-established framework for tracking where value is actually created — applied to the most recent international trade data — we find three patterns relevant to current policy:

- With most U.S. trading partners, a meaningful share of what they ship to America was originally produced somewhere else — often in the U.S. itself or in a third economy. Once you strip that out and count only the value each economy actually created, the gap with America shrinks. China is the exception: measuring by where value is actually created makes the gap bigger, not smaller.
- The reason is services. Services such as wholesale, finance, logistics, and business support are increasingly built into manufactured goods. Yet they are invisible in conventional trade statistics, which count only what crosses the border and is labeled as a service.
- Chinese-made value reaches American buyers through Mexico, Vietnam, and other assembly hubs. Tariffs on direct Chinese imports do not touch this routing — they tend to change the route of trade more than the source of value.

Together, these patterns offer a more complete picture of how trade between the United States and China actually works. That picture should help policymakers design tools that reduce barriers to mutually beneficial exchange — open negotiation on services and market access, regulatory engagement on data flows and digital services, and better measurement of where value is created — rather than tools that tax exchange itself. These reach what tariffs cannot.

Background

In recent years, U.S. policy debate about China has focused on the size of imports from China relative to U.S. exports to China. Behind this focus are real concerns: American workers and firms compete with a state-directed economy; key supply chains have become overly dependent on a single strategic rival; and some Chinese policies on

intellectual property, market access, and subsidies do not adhere to the same rules as those of most other major economies.

Starting in 2018, the U.S. response increasingly relied on tariffs. The major instrument was Section 301 of the Trade Act of 1974², a U.S. law that allows the federal government to impose tariffs on imports from a country whose trade practices it deems unfair. Section 301 tariffs were imposed on hundreds of billions of dollars of Chinese imports over multiple rounds, covering everything from industrial machinery to consumer electronics. Put simply, the U.S. imposed tariffs on goods imported directly from China to pressure China to change its trade practices and reduce American reliance on Chinese imports.

This approach rests on two basic assumptions: (1) that trade deficits with China are harmful, and (2) that standard trade statistics, which record the value of goods crossing the U.S.-China border, accurately capture the real economic relationship between the two countries. If those assumptions are correct, then taxing direct imports from China may seem like a policy tool. But if not, tariffs may harm the U.S. economy and distort reported trade numbers without altering the underlying economic realities those numbers are meant to measure. This brief tests those assumptions and finds that they do not hold.

Why Economists Are Skeptical of Tariffs

Before turning to our findings, it is worth reviewing what mainstream economic theory says about tariffs: they are a costly policy tool, and their benefits rarely outweigh their costs.

Tariffs raise prices for American buyers

A tariff is, in plain terms, a tax that the U.S. government collects on imported goods when they enter the country. The importer pays the tax at the border, and in practice, that cost is passed along — to American firms that use those goods as inputs, and to American households that buy the final products. Recent studies of the 2018–2019 tariffs confirm this pattern. Research shows that, in sectors affected by the tariffs, prices of U.S.-made intermediate and final goods rose significantly compared with those in unaffected sectors. The tariffs also disrupted supply-chain networks, reduced the range of imported varieties available to U.S. buyers, and were fully passed through into the domestic prices of imported goods.³

Tariffs invite retaliation

When one country imposes tariffs, the affected trading partner typically responds with tariffs of its own. China retaliated against U.S. exports — particularly agricultural goods like soybeans⁴ — and the U.S. farm sector required substantial federal support payments to offset the resulting losses. Tariffs are often easy to introduce but difficult to contain, and their costs can fall on domestic exporters who were not involved in the original dispute.

Tariffs distort supply chains without necessarily improving domestic production

Standard trade theory says that tariffs usually reduce overall economic welfare in the country that imposes them. Protected domestic producers and the government may gain, but those gains are often smaller than the losses faced by consumers and firms that rely on imported inputs. Recent studies of the 2018 tariffs also find net welfare losses for the U.S. economy.⁵ And even when tariffs push production out of the targeted country, that production does not necessarily return to the United States. It often moves to other foreign economies instead.⁶

Tariffs invite lobbying and waste sources

A further cost of tariffs, less visible than higher prices, is the lobbying activity they invite. Once the federal government can confer protection from foreign competition, firms have a strong incentive to spend on lobbying, legal strategy, and political access to secure that protection. Resources spent securing tariff coverage, exemptions, or favorable rules are resources not spent on research and development, plant upgrades, training, or other productive activities. The result is not only a tax on trade, but also a shift of business effort away from innovation and toward political advantage.

This does not mean tariffs are never justified. There may be narrow cases, such as national security or strategic industries, where tariffs have a role. But as a broad tool for managing a complex economic relationship like the U.S.-China relationship, tariffs carry real and well-documented costs.

Bilateral trade deficits are not a sign of weakness

More fundamentally, economists are skeptical of using the trade deficit itself as the primary policy target. A trade deficit is not automatically a sign of weakness or unfair

trade. At the national level, the current account balance largely reflects the gap between national savings and domestic investment. The United States runs a current account deficit because it invests more than it saves, and the difference is financed by foreign capital flowing into U.S. assets. Those inflows help fund investment and reflect the continued attractiveness of the United States as a place to put capital. Because tariffs do not change the underlying savings-investment balance, they usually do not reduce the overall trade deficit.

The rest of this brief sets the general costs of tariffs aside — not because they are negligible, but to ask a separate question: do tariffs at least achieve what they were designed to do? Our findings suggest the answer is no.

A Brief Note on the Data

The findings below come from two well-established international trade datasets: the GTAP 12 Database (2023), maintained by Purdue University's Global Trade Analysis Project, and the OECD's Trade in Value Added (TiVA) series, 2025 edition.⁷

International organizations, central banks, and academic researchers widely use both. They have one feature that ordinary trade statistics lack: they allow us to track not just goods crossing borders, but where the value inside those goods was actually created.

We use the method developed by Johnson and Noguera (2012)⁸, which distinguishes between gross and value-added exports. Gross exports measure the full recorded value of goods when they cross the border. Value-added exports measure only the value created by the exporting economy itself, after removing the foreign inputs embedded in that good.

Throughout this brief, we refer to the VAX ratio, or the ratio of value-added exports to gross exports. A VAX ratio close to 1 means that an economy's exports mostly reflect value created at home. A lower VAX ratio means that an economy is using more foreign inputs, often through assembly or re-exporting.

We also refer to the value-added deficit. This is the bilateral trade deficit measured in value-added terms rather than in gross terms. It measures the same trading relationship from a different angle and can lead to a different conclusion. It is important to note that this difference matters mainly at the bilateral level. For the United States as a whole, the total trade balance is the same whether measured in gross or value-added terms. Value-

added accounting does not change the overall size of the deficit. It reallocates the deficit across trading partners according to where value was actually created. One country’s measured deficit may shrink, while another’s may grow, but these changes offset each other when all partners are added together. The appendix provides the full technical methodology and a complete table of VAX ratios for more than 140 economies.

Key Findings

The Global Picture: Where Economies Sit in Production Networks

The proportion of export value produced domestically varies systematically depending on an economy’s position in global production networks. Economies that mainly assemble goods using imported parts have low domestic production because much of what they ship out was originally made elsewhere. Economies that produce more of their own inputs have higher proportions produced domestically. This is the central pattern documented by Johnson and Noguera (2012): exporters concentrated in finished manufactures show lower proportions produced domestically than those concentrated in agriculture, raw materials, or services.

The 2023 data confirm this pattern. The most integrated assembly hubs in global manufacturing — Singapore (0.44), Vietnam (0.47), Malaysia (0.52), and Taiwan (0.59) — show the lowest VAX ratios, reflecting their role as assembly nodes whose exports contain heavy foreign content. Large, diversified economies sit higher: China (0.81), the United States (0.79), Japan (0.78), and Germany (0.64). The full table for over 140 economies appears in the appendix.

The U.S.-China Relationship Looks Different from Every Other Partner

Table 1 shows U.S. bilateral trade balances with seven major partners — measured first in conventional gross terms, then in value-added terms. Figure 1 displays the same comparisons as a bar chart.

Table 1. U.S. Bilateral Gross and Value-Added Trade Deficits with Major Partners, 2023 (GTAP 12, USD millions)

Partner	U.S. Gross Exports	U.S. VAX	Partner Gross Exports	Partner VAX	Gross Deficit	VA Deficit
China (CHN) *	179,685	1.034	532,096	1.099	-352,411	-398,713

Table 1 (continued)

Partner	U.S. Gross Exports	U.S. VAX	Partner Gross Exports	Partner VAX	Gross Deficit	VA Deficit
Japan (JPN)	107,170	0.897	163,903	0.999	-56,733	-67,564
Canada (CAN)	355,053	0.622	453,865	0.635	-98,812	-67,449
Mexico (MEX)	288,306	0.547	494,028	0.582	-205,722	-129,998
Germany (DEU)	108,014	0.868	213,392	0.886	-105,378	-95,298
Vietnam (VNM)	11,322	0.831	116,888	0.534	-105,566	-53,029
Korea (KOR)	79,539	0.668	132,505	0.784	-52,966	-50,746

Notes: The VAX ratio is the share of gross exports that reflects value actually created by the exporting economy. A ratio of 0.80 means that 80 percent of the recorded export value was generated domestically, while the remaining 20 percent was attributable to foreign inputs. For total exports, the ratio cannot exceed 1.00. For bilateral trade, however, it can exceed 1.00 when some of an economy’s value reaches a partner indirectly through third countries. In that case, the partner absorbs more value from that economy than is recorded in direct bilateral export statistics.

Table 1 reveals a sharp structural divide between China and all other major U.S. trading partners. China is the only partner in which both VAX ratios exceed 1.0 — the U.S. ratio of 1.034 and China’s of 1.099. A ratio above 1.0 means that the value one economy sends to the other is actually larger than the goods crossing the border directly between them, because additional value travels indirectly — through third economies whose exports carry embedded U.S. or Chinese content. The fact that both ratios exceed 1.0 means this indirect routing runs in both directions. The fact that China’s ratio is higher means more Chinese-created value reaches the U.S. through third economies than vice versa.

The result is a value-added deficit of -\$399 billion, 13 percent larger than the gross deficit of -\$352 billion. Japan also departs from the standard pattern: despite VAX ratios below 1.0 on both sides, its value-added deficit of -\$68 billion exceeds the gross deficit of -\$57 billion, reflecting the high domestic content of Japanese exports to the U.S. relative to U.S. exports to Japan.

The remaining five partners display the classic pattern: VAX ratios below 1.0 on both sides and value-added deficits smaller than gross deficits, reflecting the fact that a significant share of what these economies export to the U.S. consists of components and inputs originally produced in the U.S. or in third economies. So once that foreign content is removed, the true deficit shrinks.

Canada illustrates this pattern: its gross deficit of -\$99 billion compresses to only -\$67

billion in value-added terms. This is because the U.S. and Canada operate deeply intertwined production networks — particularly in automotive, energy, and aerospace — where parts and materials routinely cross the border multiple times before reaching a final buyer. Under their shared free trade agreement (USMCA), factories on both sides of the border are effectively part of the same supply chain: a car assembled in Ontario contains substantial U.S.-made steel, electronics, and components. Gross trade statistics count that car as a Canadian export to the U.S. at full value. Still, value-added accounting correctly attributes U.S.-originating content back to the U.S., thereby shrinking the apparent deficit.

Mexico and Vietnam show the largest proportional compressions for a similar reason: both function primarily as final assembly locations, where imported parts — sourced heavily from China, the U.S., and East Asia — are put together and then exported. Because so much of the value in their exports was created elsewhere, their gross figures substantially overstate how much domestic value they are actually generating and sending to the U.S.

Figure 1. U.S. Bilateral Trade Deficits: Gross vs. Value-Added, 2023 (GTAP 12)

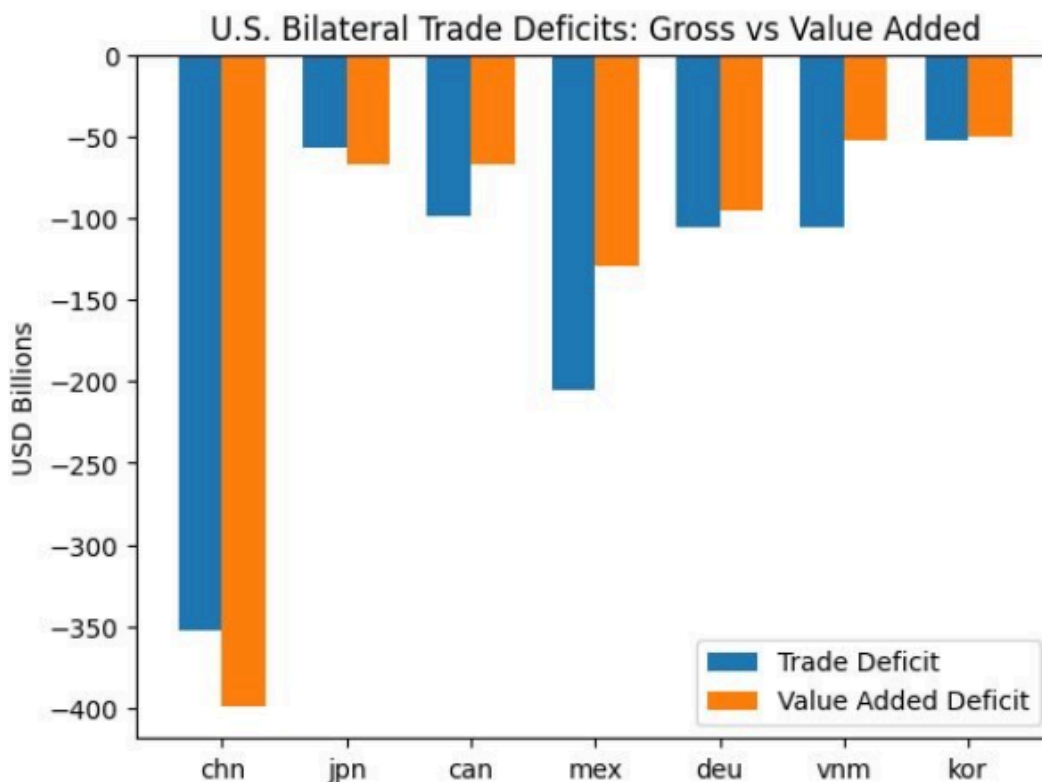


Figure 2. U.S.-China Bilateral Trade Deficit: Gross vs. Value-Added, 1995-2022 (OECD TiVA)

U.S.-China Bilateral Trade Deficit: Gross vs Value-Added (OECD TiVA)

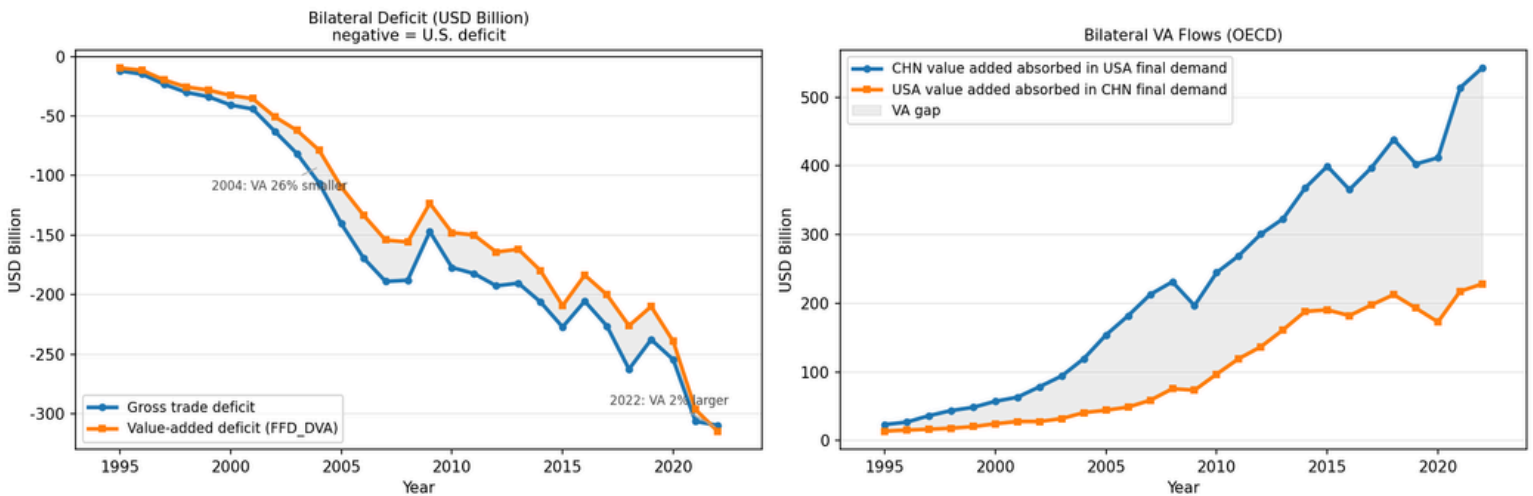


Figure 2 shows how the U.S. gross trade gap and value-added trade gap with China have changed over time. The left panel tracks both measures from 1995 to 2022. In the early 2000s, the value-added gap ran roughly 25–30 percent below the gross gap. The two lines then converged gradually and crossed in 2022, when the value-added gap exceeded the gross gap for the first time. The right panel breaks down the underlying flows: Chinese value reaching U.S. buyers (blue line) grew substantially faster than U.S. value reaching Chinese buyers (orange line), with the gap between the two widening sharply after 2018 and remaining wide through 2022.

The timing of this reversal lines up with the U.S.-China trade war. Beginning in 2018, the United States raised tariffs on about \$303 billion of annual imports, increasing the average tariff on affected products from 2.6 percent to 16.6 percent.⁹ Most important for this brief, the Section 301 tariffs covered a large share of goods imported directly from China.

These tariffs reduced direct imports from China, which lowered the gross trade flows recorded between the two countries. But they did not necessarily eliminate the Chinese value embedded in goods consumed by U.S. buyers. Instead, some production and final assembly shifted to third economies, while Chinese inputs, services, and business networks

continued to support the production of those goods. In other words, Chinese value did not disappear. More of it reached the United States indirectly.

This pattern is visible in U.S. import shares. China’s share of U.S. imports fell from about 21 percent in 2017 to about 13 percent by 2024, while economies such as Vietnam, Mexico, and Taiwan gained much of the U.S. import market share.¹⁰ This suggests that tariffs may change the route of trade more than the underlying source of value.

Services Are the Reason

To find out what makes the U.S.-China relationship different, we restricted the analysis to goods sectors only and recomputed the numbers. Table 2 shows the result.

Table 2. U.S.-China Goods-Only Vax Ratios and Bilateral Deficit, 2023 (GTAP, USD millions)

Direction	Gross Exports	VAX Ratio	VA Exports
Goods only			
USA → China (goods only)	126,235	0.764	96,393
CHN → USA (goods only)	508,880	0.794	404,102
Goods-only deficit	-382,645		-307,709

Notes: This table contains the VAX ratio using goods-producing sectors only. On a goods-only basis, both bilateral ratios are below 1.00. This means that gross goods exports include imported intermediate inputs, so they overstate the value actually created by the exporting economy. By contrast, the all-sector ratios in Table 1 are above 1.00 in both directions. The difference points to the role of services. Service value added — especially from trade, finance, business services, and transport — can reach the trading partner indirectly, embedded inside exported goods. The goods-only results, therefore, show that the above-one ratios in Table 1 are driven by embedded services value, not by goods trade alone.

When we look only at goods, the classic pattern reappears: both VAX ratios drop below 1.0, and the value-added gap (−\$308 billion) is smaller than the all-sector gross gap (−\$352 billion). In other words, the goods side of the U.S.-China relationship behaves like every other partner in Table 1. Chinese goods exports still contain meaningful foreign content , and stripping that content out shrinks the apparent imbalance. So, what reverses the picture once we include all sectors? Services. Table 3 makes this clear.

Table 3. U.S.-China Bilateral Deficit Decomposed by Sectors, 2022 (OECD)

Sector	Gross Deficit (bn)	VA Deficit (bn)	Swing (bn)
Goods	-325.6	-248.0	+77.6
Services	+15.9	-66.6	-82.5
TOTAL	-309.7	-314.5	-4.9

Look at the services row. In conventional trade statistics, the U.S. runs a small services surplus with China of about \$16 billion. In other words, more services are recorded as American exports to China than as Chinese exports to the United States. But in value-added terms, the picture reverses: the U.S. runs a services deficit of about \$67 billion with China. That is a swing of roughly \$83 billion in a single category.

Why is the swing so large? Conventional service-trade statistics count only services that cross the border explicitly as services, such as consulting fees, software licensing payments, or tuition paid by international students. But they miss two other ways Chinese service value reaches the U.S.

The first is service value embedded inside manufactured goods. Imagine, for example, a shipment of electronics arriving from China. The sticker price includes not only factory production, but also the work of Chinese wholesale traders who source components, financial firms that arrange financing, logistics companies that coordinate shipping, and business-service firms that handle compliance, marketing, and after-sales support. In conventional statistics, none of this appears in the services column. It is all recorded as part of a manufactured export.

The second channel is service value that reaches the U.S. through third economies. The U.S. may import goods or services from another economy whose own producers rely on Chinese service inputs. Conventional statistics record the immediate trading partner, but not the full chain of value creation behind the transaction.

Value-added accounting opens that box. It traces each layer of value back to the economy and industry that actually produced it. Once those hidden channels are counted, the picture flips: the U.S. is not running a services surplus with China. It is running a sizable services deficit in value-added terms.

Figure 3. U.S.-China Bilateral Deficit: Goods vs. Services Decomposition, 1995-2022 (OECD TiVA)

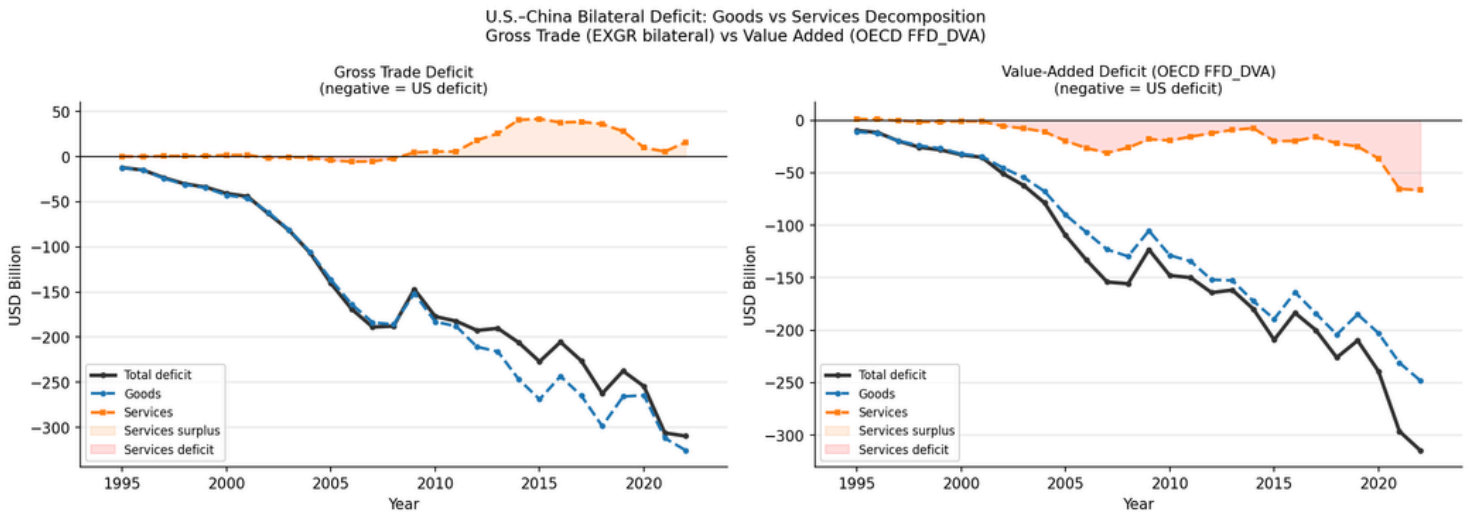


Figure 3 shows how the goods-services split changes over time. The left panel presents the conventional view. In this view, the goods deficit has driven the overall U.S.-China trade gap throughout the period. At the same time, services moved from a small U.S. deficit to a sizable surplus of about \$40 billion around 2012. From this perspective, the U.S. appears to be gaining ground in services trade with China.

The right panel tells a different story. In value-added terms, the goods gap is smaller than the total gap, indicating that goods alone cannot fully explain the imbalance. The missing piece is services. Instead of showing a surplus, the services value-added line shows a growing deficit, reaching about \$66 billion by 2022, as shown by the shaded pink area. This gap in hidden services is what pushes the total value-added deficit above the gross deficit.

Triangular Production Chains: How Tariffs Get Bypassed

Where does this hidden services value travel? Not always directly. We used the GTAP data to trace exactly which third economies sit between the U.S. and China in the flow of service value, and which sectors that value comes from. Figures 4 and 5 show the results.

Figure 4. Chinese Service VA Reaching USA: Routing Economies & Sectors (2023-GTAP 12)

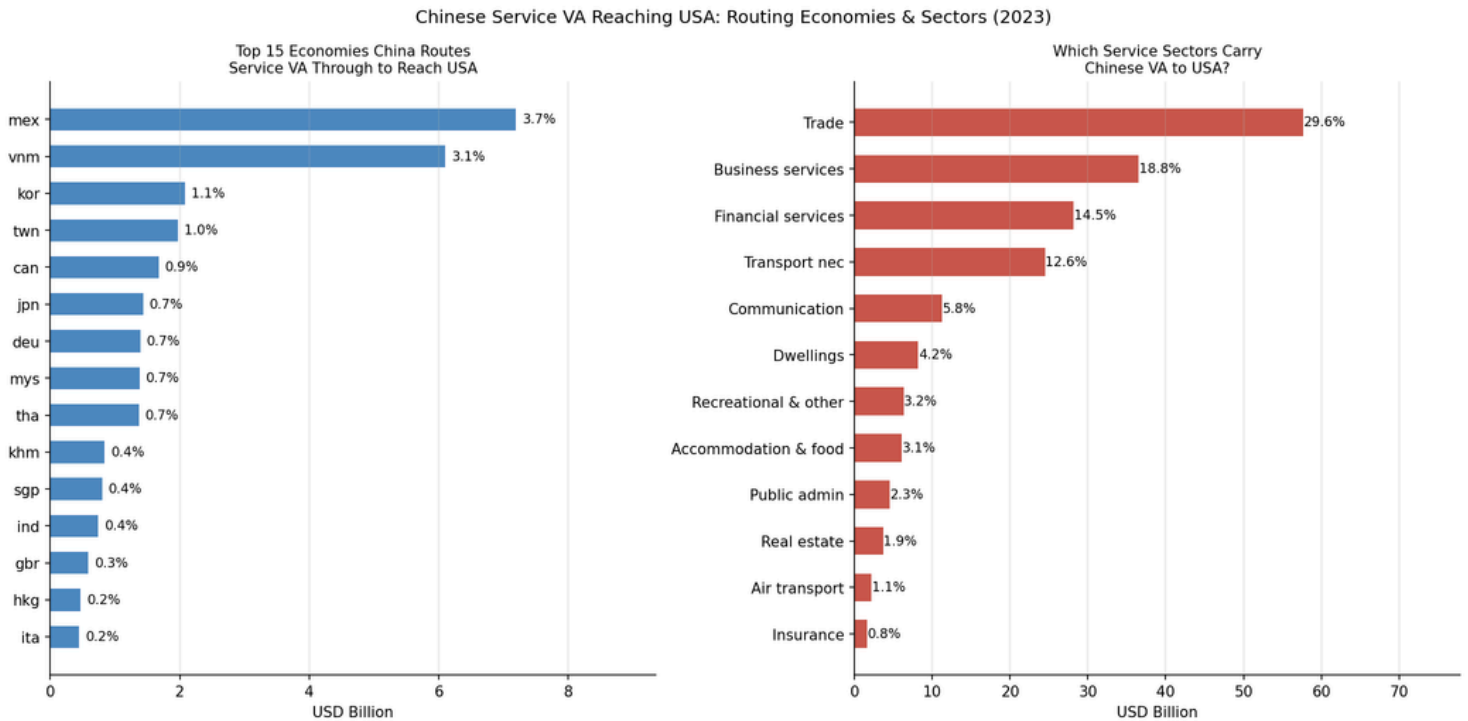


Figure 4 shows that Chinese service VA reaches the U.S. predominantly through manufacturing assembly hubs. Mexico (3.7%) and Vietnam (3.1%) are the two dominant conduits, together accounting for nearly seven percent of indirect routing, followed at a distance by Korea (1.1%), Taiwan (1.0%), and Canada (0.9%). On the sector side, the trade sector alone accounts for 29.6% of the Chinese service VA arriving in the U.S. — reflecting the wholesale and distribution networks that organize Chinese manufacturing supply chains — followed by business services (18.8%), financial services (14.5%), and transport (12.6%). These are not sectors that cross any border labelled as “Chinese services”. They arrive embedded inside electronics, machinery, and consumer goods.

Figure 5. USA Service VA Reaching China: Routing Economies & Sectors (2023-GTAP 12)

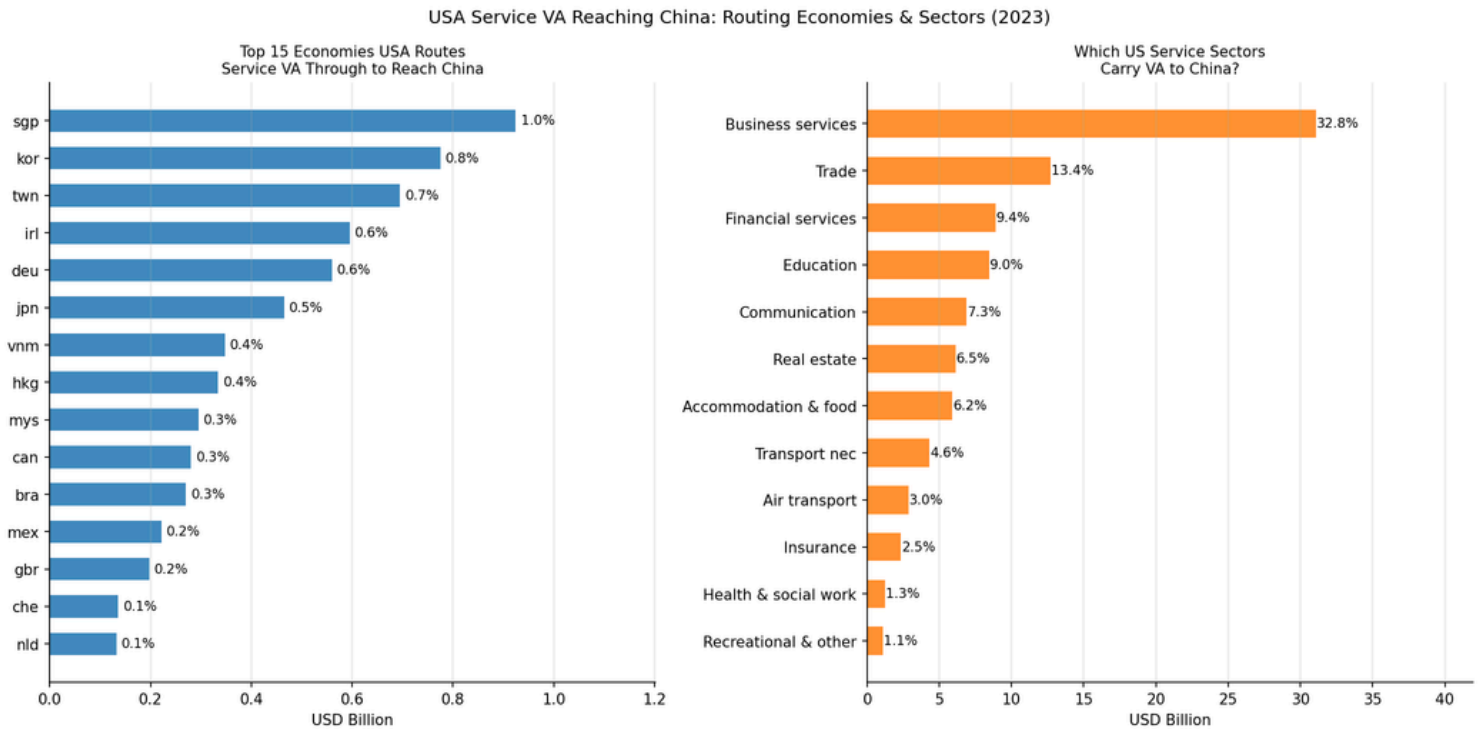


Figure 5 shows a contrasting picture for the U.S.–China direction. U.S. service VA reaches China through a different set of hubs: Singapore (1.0%), Korea (0.8%), Taiwan (0.7%), Ireland (0.6%), and Germany (0.6%) are the leading conduits — advanced financial and technology centers rather than low-cost assembly platforms. The sector composition also differs markedly: business services dominate at 32.8%, followed by trade (13.4%), financial services (9.4%), and education (9.0%). U.S. intellectual and financial services flow through these hubs rather than directly, largely because China’s restrictive digital and financial services trade regime forces U.S. firms to operate through affiliated entities in third economies.¹¹

IMF data show Chinese outward FDI to Mexico rose by approximately 300% and to Vietnam by 170% between 2018–19 and 2022–23¹², as manufacturers would like to relocate final assembly to tariff-free locations while retaining Chinese-origin service inputs. The practical consequence is that U.S. tariffs on direct Chinese imports reduce the measured gross deficit without touching the underlying value-added flows: Chinese service VA simply arrives via Mexico City or Ho Chi Minh City instead of Shenzhen, and U.S. trade

statistics record it as a Mexican or Vietnamese export.

Policy Implications

The findings above point to a clear conclusion: tariffs are a poor tool for addressing the real challenges in the U.S.-China economic relationship. The problem is not simply that the United States has a bilateral trade deficit with China. Bilateral trade balances reflect many factors — specialization, supply chain structure, and consumer demand. They do not, by themselves, show whether a trading relationship is fair, harmful, or beneficial.

As a result, tariffs on direct Chinese imports can alter headline statistics without changing the underlying policy issues. Fewer goods may be recorded as imports from China, while more may be recorded as imports from Mexico or Vietnam. But that does not mean the underlying economic relationship has been fundamentally reshaped. It may simply mean that trade has been rerouted. The trade route has changed, but the deeper questions about market access, services, technology, and the rules governing competition remain.

This distinction matters for policy. The purpose of value-added analysis is not to help policymakers find Chinese content more precisely so it can be taxed more effectively. That would repeat the same mistake in a more complicated form. The point is that headline bilateral statistics are a poor guide to policy because they do not show how value is created, how firms specialize, or where the real barriers to fair and mutually beneficial exchange are located.

The concerns behind U.S.-China trade policy — state direction, intellectual property protection, service-market access, and digital restrictions — are not mainly problems of accounting. There are problems about the conditions under which trade and investment take place. Tariffs do not address those conditions very well. They tax exchange, raise costs for American consumers and firms, invite retaliation, and encourage lobbying for protection or exemptions.

The policy lesson is therefore not to design more precise tariffs around value-added flows. It is to move away from tariff-centered thinking. If the goal is to preserve the gains from trade while addressing the real concerns in the U.S.-China relationship, policy should focus on the rules and barriers that shape value creation itself. Three policy directions follow from this analysis.

- **Open negotiation on service and market access**

The main policy barriers in the U.S.–China relationship are increasingly not only about goods crossing borders. They are also about the rules that determine whether firms can compete in service and digital markets. American firms in technology, finance, and other professional services face restrictions in China related to licensing, ownership, data localization, cybersecurity reviews, and cross-border data flows. These barriers directly limit exchange, but tariffs on goods do not address them. If the concern is limited access to Chinese service and digital markets, the answer is not a broader tariff. The answer is direct negotiation over market access, regulatory reciprocity, and shared rules for data governance and digital trade. This approach is slower and less politically visible than imposing tariffs, but it is better matched to the problem. It aims to reduce the barriers that limit mutually beneficial exchange, rather than taxing exchange itself.

- **Better measurement for a networked trade system**

If production now moves through triangular supply chains, bilateral trade statistics alone are not enough to show where economic exposure actually lies. Policymakers need better value-added trade statistics, supply-chain mapping, and data on foreign affiliate networks to understand how goods, services, and investment move through the global economy. Better measurement would help distinguish between a real change in economic relationships and a simple change in routing. The purpose of better measurement is not to justify more complicated tariffs. It is to help policymakers understand the structure of trade more accurately before choosing policy tools. A networked trade system requires networked evidence.

- **Domestic capacity in high-value services**

A longer-run lesson is that economic strength depends less on the volume of trade and more on where value is created. In modern supply chains, much of the value inside manufactured goods comes from services such as logistics, finance, business services, software, design, data, and distribution. Countries that are strong in these activities capture more value across the economy, regardless of whether the final product is sold at home or abroad. This matters for the United States. A better policy response is not to tax imports at the border, but to strengthen the domestic capabilities that allow American firms and workers to create high-value content. That includes investment in digital

infrastructure, workforce skills, innovation, transportation networks, and competitive service industries. Over the long run, this kind of capacity-building matters more than trying to manage trade through tariffs. Tariffs can change prices and trade routes, but they do not build the service capabilities that increasingly determine where value is created.

Conclusion

The United States has real concerns about its economic relationship with China. These concerns include state direction of the economy, weak intellectual property protection, and restrictions on market access in services and digital trade. But these are concerns about the rules under which exchange takes place, not about the existence of trade itself. Trade between the United States and China exists because each side specializes in what it produces relatively well, and that specialization has raised welfare on both sides. Section 301 tariffs were a forceful response to valid concerns, but they tax welfare-enhancing exchange rather than directly addressing the rules that shape that exchange.

Modern trade also makes tariffs less effective than headline statistics suggest. U.S.–China trade is not limited to goods shipped directly from China to the United States. It includes services embedded in manufactured goods and supply chains that move through third economies. Looking at trade through a value-added lens shows more service content and more triangular routing than gross bilateral statistics reveal. This fuller picture matters because it shows what is actually being exchanged and where value is created. It does not turn a bilateral trade deficit into evidence of harm. Bilateral imbalances are often normal byproducts of specialization, consumer demand, capital flows, and supply-chain routing.

For that reason, the headline bilateral trade deficit is not, by itself, a reliable measure of the health or fairness of the U.S.–China economic relationship. Gross trade numbers often show where a product was last shipped from, not where its value was created. A policy that targets the headline number risks treating a statistical label as the real problem. Tariffs may change the route of trade, but they do not necessarily change the underlying structure of value creation. In the meantime, they impose clear costs: higher prices for American consumers and firms, retaliation against U.S. exporters, supply chain disruption, and resources diverted to lobbying for protection or exemptions.

Trade policy still matters, and the United States has real interests to advance with China. But preserving the gains from specialization should be the starting point, not an

afterthought. A better approach would focus on the rules and barriers that shape value creation itself: negotiations on services and market access, stronger engagement on data and digital trade rules, and better measurement of value-added trade. These tools are less blunt than tariffs and better matched to the structure of modern trade. They address the channels that tariffs cannot reach.

Appendix

A.1. Methodology

We apply Johnson and Noguera (2012) Definition 1: total value added produced in sector s in source economy i and absorbed in destination economy j is $va_{ij}(s) = r_i(s) \times y_{ij}(s)$ where $r_i(s)$ is the value-added to output ratio and $y_{ij}(s) = (I - A)^{-1}c_j$ is the output of economy i required to satisfy economy j 's final demand, computed via the global Leontief inverse. The sector dimension s refers to the industry of value-added origin in the source economy, not the sector of the good crossing the border. This means that Chinese wholesale or financial-service value added may still be counted as service-sector value added even when it reaches the U.S., embedded in manufactured electronics. We then use these measures to analyze both aggregate VAX ratios across economies and bilateral trade deficits between the United States and major partners.

A.2. Data Sources

Data Source	Coverage	Use in this Analysis
GTAP 12 Database (2023)	163 economies, 65 sectors	Primary: Leontief matrices, VAX ratios, triangular chain decomposition
OECD TiVA FFD_DVA (2025 ed.)	80 economies, 50 sectors, 1995–2022	Validation: bilateral VA deficit and goods/services decomposition
OECD TiVA EXGR (2025 ed.)	80 economies, 50 sectors, 1995–2022	Gross bilateral exports by sector
Johnson & Noguera (2012)	94 economies, 57 sectors, 2004	Benchmark: 2004 baseline VAX ratios and US-China deficit

A.3. Full Vax Ratios by Economy (2023)

VAX Ratio = Value-Added Exports ÷ Gross Exports. Ratios below 1 indicate that gross exports exceed the domestic value-added embodied in them. Composite region codes (e.g., XOC = Rest of Oceania) represent groups of economies not individually listed in the GTAP database and are shown in italics.

Economy	Code	VAX Ratio
<i>East Asia & Pacific</i>		
Australia	AUS	0.87
China	CHN	0.81
Hong Kong	HKG	0.69
Indonesia	IDN	0.85
Japan	JPN	0.78
Korea	KOR	0.57
Malaysia	MYS	0.52
Mongolia	MNG	0.72
New Zealand	NZL	0.85
Philippines	PHL	0.74
Singapore	SGP	0.44
Taiwan	TWN	0.59
Thailand	THA	0.56
Vietnam	VNM	0.47
<i>Rest of Oceania</i>	XOC	0.72
<i>Rest of East Asia</i>	XEA	0.80
<i>Rest of Southeast Asia</i>	XSE	0.72
<i>South Asia</i>		
Bangladesh	BGD	0.76
India	IND	0.76
Nepal	NPL	0.77

Economy	Code	VAX Ratio
Pakistan	PAK	0.86
Sri Lanka	LKA	0.78
Rest of South Asia	XSA	0.69
North America		
Canada	CAN	0.71
Mexico	MEX	0.61
United States	USA	0.79
Rest of North America	XNA	0.40
Latin America & Caribbean		
Argentina	ARG	0.86
Bolivia	BOL	0.88
Brazil	BRA	0.83
Chile	CHL	0.81
Colombia	COL	0.85
Costa Rica	CRI	0.76
Dominican Republic	DOM	0.81
Ecuador	ECU	0.84
Guatemala	GTM	0.82
Haiti	HTI	0.88
Honduras	HND	0.69
Jamaica	JAM	0.67
Nicaragua	NIC	0.74
Panama	PAN	0.69
Paraguay	PRY	0.80
Peru	PER	0.89
Puerto Rico	PRI	0.88
El Salvador	SLV	0.79
Trinidad & Tobago	TTO	0.83

Economy	Code	VAX Ratio
Uruguay	URY	0.82
Venezuela	VEN	0.90
Rest of South America	XSM	0.71
Rest of Central America	XCA	0.56
Rest of Caribbean	XCB	0.86
Western Europe		
Austria	AUT	0.59
Belgium	BEL	0.45
Cyprus	CYP	0.58
Denmark	DNK	0.65
Finland	FIN	0.65
France	FRA	0.68
Germany	DEU	0.64
Greece	GRC	0.68
Ireland	IRL	0.61
Italy	ITA	0.66
Luxembourg	LUX	0.36
Malta	MLT	0.46
Netherlands	NLD	0.57
Norway	NOR	0.83
Portugal	PRT	0.66
Spain	ESP	0.66
Sweden	SWE	0.66
Switzerland	CHE	0.56
United Kingdom	GBR	0.72
Rest of Western Europe	XEF	0.80
Central & Eastern Europe		
Albania	ALB	0.77

Economy	Code	VAX Ratio
Belarus	BLR	0.51
Bulgaria	BGR	0.63
Croatia	HRV	0.65
Czech Republic	CZE	0.51
Estonia	EST	0.53
Hungary	HUN	0.44
Latvia	LVA	0.60
Lithuania	LTU	0.56
Poland	POL	0.58
Romania	ROU	0.74
Russia	RUS	0.91
Serbia	SRB	0.62
Slovakia	SVK	0.45
Slovenia	SVN	0.42
Ukraine	UKR	0.74
<i>Rest of Eastern Europe</i>	XEE	0.66
<i>Rest of Europe</i>	XER	0.63
<i>Rest of Former Soviet Union</i>	XSU	0.94
Middle East & North Africa		
Algeria	DZA	0.94
Armenia	ARM	0.66
Azerbaijan	AZE	0.95
Bahrain	BHR	0.69
Egypt	EGY	0.74
Georgia	GEO	0.76
Iran	IRN	0.96
Iraq	IRQ	0.90
Israel	ISR	0.80

Economy	Code	VAX Ratio
Jordan	JOR	0.59
Kazakhstan	KAZ	0.88
Kuwait	KWT	0.93
Kyrgyzstan	KGZ	0.48
Morocco	MAR	0.62
Oman	OMN	0.81
Qatar	QAT	0.88
Saudi Arabia	SAU	0.94
Tajikistan	TJK	0.71
Tunisia	TUN	0.58
Turkey	TUR	0.66
UAE	ARE	0.58
Uzbekistan	UZB	0.76
Rest of Western Asia	XWS	0.34
Rest of North Africa	XNF	0.84
Sub-Saharan Africa		
Angola	AGO	0.79
Botswana	BWA	0.68
Burkina Faso	BFA	0.79
Burundi	BDI	0.69
Cameroon	CMR	0.83
Côte d'Ivoire	CIV	0.83
DR Congo	COD	0.81
Ethiopia	ETH	0.92
Gabon	GAB	0.81
Ghana	GHA	0.79
Guinea	GIN	0.76
Kenya	KEN	0.77

Economy	Code	VAX Ratio
Madagascar	MDG	0.72
Malawi	MWI	0.73
Mali	MLI	0.84
Mauritania	MRT	0.72
Mauritius	MUS	0.74
Mozambique	MOZ	0.46
Namibia	NAM	0.63
Niger	NER	0.96
Nigeria	NGA	0.90
Rwanda	RWA	0.75
Senegal	SEN	0.68
South Africa	ZAF	0.72
Sudan	SDN	0.81
Swaziland	SWZ	0.81
Tanzania	TZA	0.89
Togo	TGO	0.58
Uganda	UGA	0.88
Zambia	ZMB	0.72
Zimbabwe	ZWE	0.81
<i>Rest of West Africa</i>	XWF	0.40
<i>Rest of Central Africa</i>	XEC	0.56
<i>Rest of South African Customs Union</i>	XSC	0.69

A.4. Potential Mechanisms

China's Domestic Service Sector Expansion

- Kee and Tang (2016)¹³ document that China defied the declining trend in domestic content in exports seen across most economies. They find that China's domestic content in exports rose from 65 to 70 percent between 2000 and 2007, driven by individual processing exporters substituting domestic for imported materials. This substitution was not spontaneous: it was induced by China's own trade and investment liberalization, which deepened its engagement in global value chains. The implication is that China's integration into global trade actively built up its domestic service and input industries, creating the very supply-side capacity that now generates the large value-added.
- Services account for more than 70% of world GDP yet only around 20% of world trade when measured in conventional balance-of-payments terms. In value-added terms, accounting for services embodied in exported goods, the true share of services in world trade rises to 40%— a gap that reflects how much service value is embedded invisibly inside traded goods rather than crossing borders labelled as a service¹⁴. China illustrates this dynamic acutely: the WTO estimates that services accounted for 30% of the value of China's manufactured exports in 2015, up to 19% growth since 2005¹⁵.
- China's domestic service-sector expansion has been reinforced by rapid digital-infrastructure buildout. By 2023, China had built the world's largest 5G standalone network, with 3.377 million 5G base stations, 805 million 5G mobile users, and more than 30,000 5G vertical-industry users, strengthening the domestic communications and information infrastructure that supports service value creation inside production networks¹⁶. This expansion has been closely tied to industrial and producer services rather than consumer use alone. China's 5G applications are concentrated in areas such as industrial internet, smart city, medical care, education, information service, and smart logistics, suggesting that service-sector growth has been embedded directly in manufacturing, coordination, and distribution systems.

Regulatory Asymmetries in Service Trade

- China maintains one of the most restrictive digital-services trade regimes among major economies. Barriers such as licensing requirements, equity caps, data-localization rules,

cybersecurity reviews, and tight controls on cross-border data flows limit direct U.S. exports in technology, finance, and other professional services¹⁷. As a result, U.S. service value added often reaches China indirectly through affiliates or third-economy hubs such as Singapore, Korea, and Ireland rather than through open cross-border trade.

- U.S. national-security restrictions have narrowed some direct channels for Chinese digital and telecom services rather than eliminating Chinese value added altogether. The Federal Communications Commission (FCC)'s Covered List blocks certain Chinese telecom equipment and services, including Huawei and ZTE, from approval and use in U.S. communications networks¹⁸. More recently, Bureau of Industry and Security (BIS) also restricted certain China-linked connected-vehicle software and hardware¹⁹. Together, these measures make direct market access harder in selected digital and telecom segments, which can push Chinese service-related value into indirect channels or embed it inside traded goods instead of appearing as straightforward bilateral service exports.

Rerouting Through Connector Economies

- The rise of ASEAN as a U.S. import alternative does not necessarily mean reduced Chinese value-added exposure. Much of ASEAN's diversification boom has been supported by Chinese and foreign multinationals relocating in tandem, leaving regional production still closely tied to Chinese supply chains. As a result, Chinese value added can continue reaching the U.S. market through ASEAN-based production networks rather than only through direct China-origin exports.
- U.S. service value added is often delivered through foreign affiliates and regional hub economies rather than only through direct cross-border exports. BEA reports that, in 2023, services supplied to foreign persons through foreign affiliates of U.S. multinationals reached \$2.2 trillion and that affiliates supplied most U.S. services provided abroad²⁰. BEA also identifies Ireland as one of the largest locations for U.S. affiliate-based activity²¹, while the U.S. International Trade Administration describes Singapore as a gateway to Southeast Asia and reports that the United States was the largest source of FDI stock there, at \$424.2 billion in 2023²². Together, these patterns suggest that part of U.S. service value creation is routed through offshore and regional hubs before appearing in final trade flows.

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